

Branch Name:	Mechanical Engineering (Production Technology)
Program Code:	ET209
Course Name:	Advanced Machine Tool Design
Course Code:	2ET2090104T
Pre-requisite Course:	Zeal to learn the subject.

Course Objectives:

1. To understand the procedure for the selection of the different machine tool mechanisms.
2. To design the Multi speed Gear box and feed drives.
3. To develop the machine tool structures.
4. To give students an elementary idea about the designing the guide ways and power screws.
5. To design the spindles and bearings.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
4	3	1	-	4	24	60	16	40	-	-	-	-	100

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	Machine Tool Drive: Working and auxiliary motion in machine, Machine tool drives, Hydraulic transmission, Mechanical transmission, General requirements of machine tool design, Layout of machine tools.	03	12
2	Regulation of Speed and Feed Rates: Aim of speed feed regulation, stepped regulation of speed, design of speed box, Design of feed box, Special cases of gear box design, regulation of speed and feed rates.	05	12
3	Design of Machine Tool Structure: Fundamentals of machine tool structures and their requirements, Design criteria of machine tool structure, Static and dynamic stiffness, Design of beds and columns, Design of housing models, Techniques in design of machine tool structure.	08	17
4	Design of Guide-ways and power Screws: Function and type of guide-ways, design of slide-ways, Protecting devices for slide-ways, Design of power screws. Design of antifriction recirculating ball type lead screw, linear motion.	07	15
5	Design of Spindles and Spindle Supports: Materials for spindles, Design of spindles, Antifriction bearings, Sliding bearings.	05	12
6	Dynamics of Machines Tools: General procedure of assessing dynamic stability of EES, Cutting processing, Closed loop system, Dynamic characteristics of cutting Process, Stability analysis.	08	17

7	Machine tool Testing: General criteria and procedure of testing of Lathe, Milling, Shaper, Grinding, Saw etc.	06	15
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List of Reference Books:

1. HMT, "Mechatronics", Tata McGraw Hill, 1998.
2. Mehta N.K. , "Machine Tool Design", Tata McGraw Hill, 1996.
3. Basu S.K. , Pal D.K., "Design of Machine Tools", Oxford & IBH publishing Co.1983.
4. Sen G.C.,Bhattacharya A., "Principles of Machine Tools", New Central Book Agencies, 1971.
5. Boothroyd G. , "Fundamentals of Metal Machining and Machine Tools", McGraw Hill,1985.
6. Acherkan N.S., "Machine Tool Design", Vol 2 & 3, MIR Pub, 1973.
7. Koenigsberger F.,"Design Principles of Metal-Cutting Machine Tools", Pergamon Press, 1964
8. Koenigsberger F. , "Machine Tool Structures", Pergamon Press,1970.

List of Tutorials:

1. Machine Tool Drive.
2. Regulation of Speed and Feed Rates.
3. Design of Machine Tool Structure.
4. Design of Guide-ways and power Screws.
5. Design of Spindles and Spindle Supports.
6. Dynamics of Machines Tools.

E-Resources:

1. <https://nptel.ac.in/courses/112105233>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Recall the procedure for the selection of the different machine tool mechanisms	2 Understanding
CLO2	Design the Multi speed Gear Box and feed drives	1 Remembering
CLO3	Design the machine tool structures	3 Applying 4 Analyze
CLO4	Design the guide ways and power screws	2 Understanding 6 Creating
CLO5	Design the spindles and bearings.	5 Evaluating
CLO6	Learn the applications of machine tool testing.	2 Understanding

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CLO1	H	M	L			M	L				L			
CLO2			M	M	L	L							L	
CLO3		L	M		H			L	M	M			M	
CLO4		L	M		H			L	M	M			M	
CLO5		M		M	L		L							M
CLO6								M		M	L	L		L

H: High, M: Medium, L: Low